



Contract # 059251

## STATE OF UTAH CONTRACT

1. **CONTRACTING PARTIES:** This contract is between the following agency of the State of Utah: **Department of Transportation**, Agency Code: **810, Research Division**, referred to as (STATE), and the following CONTRACTOR:

**Brigham Young University's, Office of Research and Creative Activities**  
Name

A285 ASB  
Address

Provo  
City

Utah  
State

84602  
Zip

Contact Person  
Federal Tax ID

**Gary Reynolds**  
# 87-0217280

Phone # 801.422.6177  
Vendor # 19106D

Email gary\_reynolds@byu.edu  
Commodity Code # 91846000000

## LEGAL STATUS OF CONTRACTOR

☐ Sole Proprietor  
☒ Non-Profit Corporation  
☐ For-Profit Corporation  
☐ Partnership  
☐ Government Agency

2. **GENERAL PURPOSE OF CONTRACT:** The general purpose of this contract is to provide: **Spatial and Temporal Analysis of Work Zone Crashes and Investigation of Relationship between Work Zone Traffic Control Measures and Crash Occurrence**
3. **PROCUREMENT:** This contract is entered into as a result of an approved Sole Source request, # **SS05218** (attached).
4. **CONTRACT PERIOD:** Effective date 01 May 2005 Termination date 30 April 2006, unless terminated early or extended in accordance with the terms and conditions of this contract.
5. **CONTRACT COSTS:** CONTRACTOR will be paid a maximum of ~~\$12,947.00~~ <sup>\$35,606.00</sup> for costs authorized by this contract.
6. **ATTACHMENT A:** Standard Terms and Conditions  
**ATTACHMENT B:** Scope of Work and Pricing  
**ATTACHMENT C:** Special Terms and Conditions  
**ATTACHMENT D:** Sole Source Authorization

Any conflicts between Attachment A and other Attachments will be resolved in favor of Attachment A.

7. **DOCUMENTS INCORPORATED INTO THIS CONTRACT BY REFERENCE BUT NOT ATTACHED:**
- All other governmental laws, regulations, or actions applicable to the goods and/or services authorized by this contract.
  - Utah State Procurement Code, Procurement Rules.

IN WITNESS WHEREOF, the parties sign and cause this contract to be executed.

CONTRACTOR

*Gary Reynolds* 6/9/05  
Signature Date

Gary Reynolds, Director

STATE

*Kelvin G. Thacker* 2 Jun 05  
Kelvin G. Thacker, Procurement Services Manager Date

*[Signature]* JUN 29 2005  
Director, Division of Purchasing

Date

PROCESSED BY  
DIVISION OF FINANCE

Director, Division of Finance

JUL - 1 2005

Date

Denice McCarthy  
Agency Contact Person

801.965.4761  
Telephone Number

801.9654073  
Fax Number

Dmccarthy@utah.gov  
Email Address

(Revision 08/26/2003)

JUL 08 2005

**ATTACHMENT A**  
**STANDARD TERMS AND CONDITIONS**

1. **AUTHORITY:** Provisions of this contract are pursuant to the authority set forth in 63-56, Utah Code Annotated, 1953, as amended, Utah State Procurement Rules (Utah Administrative Code Section R33), and related statutes which permit the State to purchase certain specified services, and other approved purchases for the State.
2. **CONTRACT JURISDICTION, CHOICE OF LAW, AND VENUE:** The provisions of this contract shall be governed by the laws of the State of Utah. The parties will submit to the jurisdiction of the courts of the State of Utah for any dispute arising out of this Contract or the breach thereof. Venue shall be in Salt Lake City, in the Third Judicial District Court for Salt Lake County.
3. **LAWS AND REGULATIONS:** Any and all supplies, services and equipment furnished will comply fully with all applicable Federal and State laws and regulations.
4. **RECORDS ADMINISTRATION:** The Contractor shall maintain, or supervise the maintenance of all records necessary to properly account for the payments made to the Contractor for costs authorized by this contract. These records shall be retained by the Contractor for at least four years after the contract terminates, or until all audits initiated within the four years, have been completed, whichever is later. The Contractor agrees to allow State and Federal auditors, and State Agency Staff, access to all the records to this contract, for audit and inspection, and monitoring of services. Such access will be during normal business hours, or by appointment.
5. **CONFLICT OF INTEREST:** Contractor represents that none of its officers or employees are officers or employees of the State of Utah, unless disclosure has been made in accordance with 67-16-8, Utah Code Annotated, 1953, as amended.
6. **CONTRACTOR, AN INDEPENDENT CONTRACTOR:** The Contractor shall be an independent contractor, and as such, shall have no authorization, express or implied, to bind the State to any agreements, settlements, liability, or understanding whatsoever, and agrees not to perform any acts as agent for the State, except as herein expressly set forth. Compensation stated herein shall be the total amount payable to the Contractor by the State. The Contractor shall be responsible for the payment of all income tax and social security amounts due as a result of payments received from the State for these contract services. Persons employed by the State and acting under the direction of the State shall not be deemed to be employees or agents of the Contractor.
7. **INDEMNITY CLAUSE:** The Contractor agrees to indemnify, save harmless, and release the State OF UTAH, and all its officers, agents, volunteers, and employees from and against any and all loss, damages, injury, liability, suits, and proceedings arising out of the performance of this contract which are caused in whole or in part by the negligence of the Contractor's officers, agents, volunteers, or employees, but not for claims arising from the State's sole negligence.
8. **EQUAL OPPORTUNITY CLAUSE:** The Contractor agrees to abide by the provisions of Title VI and VII of the Civil Rights Act of 1964 (42USC 2000e) which prohibits discrimination against any employee or applicant for employment or any applicant or recipient of services, on the basis of race, religion, color, or national origin; and further agrees to abide by Executive Order No. 11246, as amended, which prohibits discrimination on the basis of sex; 45 CFR 90 which prohibits discrimination on the basis of age; and Section 504 of the Rehabilitation Act of 1973, or the Americans with Disabilities Act of 1990 which prohibits discrimination on the basis of disabilities. Also, the Contractor agrees to abide by Utah's Executive Order, dated March 17, 1993, which prohibits sexual harassment in the work place.
9. **SEPARABILITY CLAUSE:** A declaration by any court, or any other binding legal source, that any provision of this contract is illegal and void shall not affect the legality and enforceability of any other provision of this contract, unless the provisions are mutually dependent.
10. **RENEGOTIATION OR MODIFICATIONS:** This contract may be amended, modified, or supplemented only by written amendment to the contract, executed by the same persons or by persons holding the same position as persons who signed the original agreement on behalf of the parties hereto, and attached to the original signed copy of the contract.
11. **DEBARMENT:** The Contractor certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction (contract), by any governmental department or agency. If the Contractor cannot certify this statement, attach a written explanation for review by the State. The Contractor must notify the State Director of Purchasing within 30 days if debarred by any governmental entity during the Contract period.
12. **TERMINATION:** Unless otherwise stated in the Special Terms and Conditions, this contract may be terminated, with cause by either party, in advance of the specified termination date, upon written notice being given by the other party. The party in violation will be given ten (10) working days after notification to correct and cease the violations, after which the contract may be terminated for cause. This contract may be terminated without cause, in advance of the specified expiration date, by either party, upon 30 days prior written notice being given the other party. On termination of this contract, all accounts and payments will be processed according to the financial arrangements set forth herein for approved services rendered to date of termination.
13. **NONAPPROPRIATION OF FUNDS:** The Contractor acknowledges that the State cannot contract for the payment of funds not yet appropriated by the Utah State Legislature. If funding to the State is reduced due to an order by the Legislature or the Governor, or is required by State law, or if federal funding (when applicable) is not provided, the State may terminate this contract or proportionately reduce the services and purchase obligations and the amount due from the State upon 30 days written notice. In the case that funds are not appropriated or are reduced, the State will reimburse Contractor for products delivered or services performed through the date of cancellation or reduction, and the State will not be liable for any future commitments, penalties, or liquidated damages.
14. **SALES TAX EXEMPTION:** The State of Utah's sales and use tax exemption number is E33399. The tangible personal property or services being purchased are being paid from State funds and used in the exercise of that entity's essential functions. If the items being purchased are construction materials, they will be converted into real property by employees of this government entity, unless otherwise stated in the contract.
15. **WARRANTY:** The contractor agrees to warrant and assume responsibility for all products (including hardware, firmware, and/or software products) that it licenses, contracts, or sells to the State of Utah under this contract for a period of one year, unless otherwise specified and mutually agreed upon elsewhere in this contract. The contractor (seller) acknowledges that all warranties granted to the buyer by the Uniform Commercial Code of the State of Utah apply to this contract. Product liability disclaimers and/or warranty disclaimers from the seller are not applicable to this contract unless otherwise specified and mutually agreed upon elsewhere in this contract. In general, the contractor warrants that: (1) the product will do what the salesperson said it would do, (2) the product will live up to all specific claims that the manufacturer makes in their advertisements, (3) the product will

**ATTACHMENT B  
-SCOPE OF WORK-**

**UTRAC Research Proposal**

**RESEARCH AREA**

Traffic and Safety & Construction

**PROPOSAL TITLE**

**Spatial and Temporal Analysis of Work Zone Crashes and Investigation of  
Relationship between Work Zone Traffic Control Measures and Crash Occurrence**

**SUBMITTED TO:**

Doug Anderson  
Research & Development  
Utah Department of Transportation  
4501 South 2700 West  
Salt Lake City, Utah 84114

**PRINCIPAL INVESTIGATOR**

Dr. Mitsuru Saito  
Civil and Environmental Engineering Dept.  
Brigham Young University  
368 CB, Provo, Utah 84602  
Voice: (801) 422-6326; Fax: (801) 422-0159; E-mail: [msaito@byu.edu](mailto:msaito@byu.edu)

**PROPOSED COST**

Cost for the sponsor: \$35,606  
BYU contribution by reduced indirect cost charge: \$12,947  
Total cost: \$48,553

**SUBMISSION DATE**

April 6, 2005

# **Spatial and Temporal Analysis of Work Zone Crashes and Investigation of Relationship between Work Zone Traffic Control Measures and Crash Occurrence**

## **BACKGROUND**

This proposal combines the three related problem statements presented at the 2005 UTRAC: “Use of Work Zone Crash Histories – Data Mining Project,” “Determination of Crash Costs for Use in Benefit/Cost Analysis,” and “Time Factor in Analysis of Work Zone Related Crashes.” All these three studies can be done by one data set of crash records and work zone records. Hence, by collecting crash data and work zone histories (including traffic control measures used) once, the goals of these three studies can be achieved.

Due to the need for upgrades, Utah highways are constantly under maintenance, rehabilitation, and reconstruction work. Safety in work zones is a high priority for UDOT. However, the relationship between work zone crashes and traffic control measures, the relation between highway improvements and accident reduction rate, and the crash occurrence as a function of the work scheduling are not yet clear. Now that the Crash Data Delivery System of UDOT contains crash data ranging from 1994 to 2003, it is possible to conduct an in-depth work zone crash data analysis to shed light to these issues.

The results of this study can be used to develop a set of guidelines for selecting proper cost effective work zone traffic control measures, to conduct benefit/cost analyses of highway improvements in terms of crash reduction, and to allocate effectively work zone traffic enforcement budgets.

## **OBJECTIVES**

The following list of objectives combines the objectives of the three problem statements mentioned in the background.

- Find relationship between traffic control measures and crash occurrence (type and severity)
- Gather data for conducting cost/benefit comparison of types of traffic control measures and work zone characteristics
- Find timing for best allocation of traffic safety budgets for work zone traffic safety enforcements
- Develop a set of guidelines for adopting certain types of traffic control measures given the nature and characteristics of work zones

## **PROPOSED TASKS**

### ***Task 1: Literature Search***

An in-depth literature search will be conducted for publications to identify findings on the spatial and temporal analysis of work zone crashes and the relationship between the types of work zone traffic control measures and crash occurrence to obtain information for the possible establishment of cost/benefit relationship of various work zone traffic control measures for crash prevention. As Mr. Bob Westover indicated in his memo to Mr. Darrell Giannonatti, although positive separation between traveling public and work zone clearly defines the spaces of the both parties and effective for reducing run-off-the-road crashes in work zones, the application of this measures may be suitable for certain types of work zones. Other traffic control measures that will provide clearance between the traveling public and the work zone may prove to be cost effective in reducing such crashes. Data on crash type and “crash cost” will also be collected to enable the researcher to study cost/benefit issues of work zone traffic control measures.

### ***Task 2: Exploratory Data Mining***

In this task, a few work zone sites (three sites of different traffic control characteristics) will be selected for an exploratory analysis. Before beginning a full-scale analysis, it is important to investigate what will be available and how this study can be accomplished. Now that work zone records are typically archived, the research team will investigate how much of work zone data can be data-mined from the archived records. Also gathered are type of work, AADT estimates at the time the work is underway, beginning and ending mileposts, and other pertinent factors. For these exploratory study sites, crash records are data-mined from UDOT’s Crash Data Delivery System. Crash data will be extracted for the defined work zone areas of the study sites for the years beginning 1994 to 2003 (which the Crash Data Delivery System contains). Crash type, severity, location, time, and other pertinent crash data will be collected. Crash data will be collected several miles upstream and downstream of the work zone that can be used as “control” sites for comparison purposes to meet the objectives presented in the previous section.

As part of this task, the selected study sites will be visited and pertinent field data will be gathered to understand the traffic, geometric, and control conditions of the sites.

### ***Task 3: Spatial and Temporal Analysis of Crashes (for Exploratory and Full-Scale Analyses)***

Once data of traffic control measures of the selected exploratory study sites are obtained, spatial and temporal analysis of crashes will be conducted. For this analysis, crash data will be grouped into before the work, during the work, and after the work periods. The answer we try to obtain from this analysis is whether crash potentials for the three periods are similar or different among these three periods. For spatial analysis, the locations of crashes will be scrutinized to see whether crash potentials had existed before the work took place and after the work and to investigate if crash potentials increased during the work at similar locations.

The temporal analysis has three aspects. One is to find if there is any tendency of certain locations having crashes over the years regardless of the work zone. Another aspect is to find if

any timing of crash occurrence during the work. The first analysis will shed light whether certain locations will have crashes regardless of the work zone and the second analysis will provide clues for effective allocation of traffic safety enforcement budgets during the course of the work duration. The third aspect is that whether highway improvements have actually contributed to the reduction of crashes. Results of the analysis of this third aspect are used for evaluating cost/benefit issues of highway improvements.

#### ***Task 4: Crash Type and Severity Analysis (for Exploratory and Full-Scale Analyses)***

Spatial and temporal analysis will provide information on what types of traffic control measures were being used when crashes of certain types and severity level took place. Crash occurrence is probabilistic, yet the level of the probability of occurrence may be different among types of traffic control measures. This information will shed light into what types of separation method would be cost effective for certain types and magnitudes of work zones. In this task, we analyze whether there will be any relationship between the types of traffic control measures and the types of crashes that can be reduced by applying certain traffic control measures.

#### ***Task 5: Full-Scale Data Mining and Analysis***

Once the steps of analysis are experienced and the scale of analysis that can be conducted with the data gathered from the exploratory study is understood, a full-scale data mining will be conducted. Although rigorous statistics may not always work with crash analysis, the research team will determine how many study sites should be selected to make meaning arguments for research findings by consulting the BYU's Statistical Services. The steps of analysis are described in Tasks 3 and 4.

#### ***Task 6: Cost Analysis***

This task analyzes crash costs for two purposes. One purpose is to reevaluate crash costs for general cost/benefit analyses for estimating social costs that can be reduced by certain highway improvements and the other is to conduct a benefit/cost analysis of work zone traffic control type and crashes that can be reduced during the work. For this purpose it is necessary to collect cost information on both the control measures and potential crashes that can be reduced by the work zone traffic control measures and certain highway improvements. The literature search done in Task 1 will likely to provide a wealth of information on these costs. However, in order to make the data current, cost information on the state-of-the practice (and of-the-art) traffic control techniques will be gathered. Also gathered will be data on crash costs for the types of accidents that are analyzed in this study. From this task, we will develop a table of cost ranges for studied traffic control techniques and crash types and severities.

### ***Task 7: State of the Practice of Crash Cost Estimation***

A survey will be conducted of State Transportation Agencies to collect the state of the practice of crash cost estimation and use. This survey will shed some light into the current cost assignment practices when benefit/cost analyses of highway improvements are conducted in various states.

### ***Task 8: Summary of Work Zone Crash Analysis Tasks***

Data and analysis results of Tasks 1 through 7 will be synthesized to accomplish the first three objectives mentioned at the beginning of this proposal, namely:

- Find relationship between traffic control measures and crash occurrence (type and severity)
- Compile data for conducting cost/benefit comparison of types of traffic control measures and work zone characteristics
- Find timing for best allocation of traffic safety budgets for work zone traffic safety enforcements

### ***Task 9: Guidelines Development***

This task will accomplish the fourth objective of this study: Develop a set of guidelines for adopting certain types of traffic control measures given the nature and characteristics of work zones. Findings from Task 8 will provide the basis for developing a set of guidelines for adopting certain types of work zone traffic control devices given the magnitude and characteristics of traffic control measures required by the work. It is intended that the guidelines be written to become a quick guide for project engineers to consult with for prescribing appropriate traffic control measures for work zones.

### ***Task 10: Final Report Preparation***

The final report for this study summarizes all the tasks proposed in this study. The final report will contain a set of guidelines as an appendix so that it can be printed as a stand-alone collection of guidelines for use by project engineers.

### ***Task 11: Project Management***

The project will be managed by Dr. Mitsuru Saito as the Principal Investigator (PI). He will be assisted by one graduate research assistant and one undergraduate research assistant to speed up the data mining process in Tasks 5. The graduate research assistant and PI will first work on Tasks 1 through 4 to set up the procedure for Task 5 and the undergraduate research assistant will be added for Tasks 5, 6, 7, and 8.

## **DELIVERABLE**

The deliverable of this study is a comprehensive final report summarizing all the works conducted in the study and a set of guidelines for selecting work zone traffic control measures.

The final report will be written with the implementation aspect of the study in mind. The study will also produce a series of tables and figures for use by project engineers and other UDOT employees. A paper will be written on the findings to present them in a professional conference and for publication in a professional journal.

## MEETINGS

A technical advisory committee (TAC) will be formed by UDOT that will consist of representatives of UDOT's divisions and other agencies that may be benefited by the product of the study, especially employees who are in charge of traffic safety and construction. Meetings between the researchers and the TAC members will be held at minimum four times during the course of the study to give guidance to the researchers: 1) at the beginning of the study to agree upon the scope of the study, 2) at the completion of Task 1 through Task 4 to present the results of the exploratory analysis, 3) at the completion of Task 5 through Task 9, and 4) at the completion of the study after the draft final report is completed. Other meetings will be convened as needed to solicit input/feedback from the TAC members. Monthly progress reports will be sent by e-mail to all TAC members to update the work progress in between the TAC meetings.

## PERSONNEL AND SCHEDULE

The proposed study is planned to be completed in 12 months after the notification of starting the study is issued (including the final report review period). We will begin the study as soon as UDOT allows us to start the study. The names of people involved in the study and their person hours are shown in the following page (Exhibit 1), followed by a proposed task schedule table (Exhibit 2). Please note that it is assumed that the study begins in summer to benefit from the summer break when the graduate RA can work full time.

### Exhibit 1. Estimated Person Hours Allocation

Name	Title	\$ /hr	Tasks											Total
			T.1	T.2	T.3	T.4	T.5	T.6	T.7	T.8	T.9	T.10	T.11	
M. Saito**	PI	\$65	15	15	20	30	50	30	30	50	20	40	20	320
Grad RA*	RA	\$13	100	80	70	70	300	60	60	60	80	120	0	1000
Undergrad RA*	RA	\$11					200	40	40	60	0	0	0	340

Note: \* These persons' rates include their salary only.

# Dr. Saito's total time includes the time that he spends to supervise the RA during the fall and winter (160 hours) semesters as well as his summer work (160 hours).

Tasks	
T.1	Literature search
T.2	Exploratory Data Mining
T.3	Spatial and Temporal Analysis of Crashes
T.4	Crash Type and Severity Analysis
T.5	Full-Scale Data Mining and Analysis
T.6	Cost Analysis
T.7	State of the Practice of Crash Cost Estimation
T.8	Summary of Work Zone Crash Analysis Tasks
T.9	Guideline Development
T.10	Final Report Preparation
T.11	Project management



Exhibit 2. Planned Task Schedule

Tasks		One year study											
		1	2	3	4	5	6	7	8	9	10	11	12
T.1	Literature search												
T.2	Exploratory Data Mining												
T.3	Spatial/Temporal Analysis												
T.4	Crash Analysis												
T.5	Full-Scale Analysis												
T.6	Cost Analysis												
T.7	State of Practice												
T.8	Summary												
T.9	Guidelines												
T.10	Final Report												
T.11	Project Management												
Note: It is assumed that the study begins in summer to benefit from the summer break when the graduate RA can work fulltime.													

## BUDGET

Exhibit 3 shows the proposed budget. The total requested fund from UDOT is \$35,606 and BYU contribution to this project comes from the reduced indirect cost. The regular indirect cost rate is 50% this year. 10% of the direct cost is requested from UDOT (\$3,237) and the remainder 40% is a contribution from BYU (\$12,948). Hence the total cost will be \$48,553.

### *Budget justification*

The following statements were given for budget justification.

Salary and Wages: Dr. Saito charges 1.0 month payment (\$10,583) in the summer of 2005 (160 hours). He continues to supervise his graduate student in the fall and winter semesters. This portion (160 hours) is not included in the budget—it is considered to be a contribution from BYU but not listed in the budget because it is part of department research fellowship. Two research assistants will be hired: one graduate and one undergraduate student, totaling \$16,740. Benefits are added to the salary and wage section as shown in Exhibit 3. The graduate research assistant uses this study for his/her masters thesis.

Travel and Data Collection & Communication: A sum of \$2,000 is allocated for travel and data collection, including travel costs for attending TAC meetings, money needed to collect literature, postage to send questionnaires, data collection trips to the archive and study sites, and travel cost for presentation.

Publication & Supplies: A total amount of \$550 is set aside for supplies and publication.

Indirect Cost: BYU's regular indirect cost rate is 50% of the direct cost; however, BYU currently allows us to apply 10% of the direct costs, \$3,237, as the indirect cost for UDOT projects as a contribution to the State—a saving of \$12,948 to UDOT.

# Exhibit 3. Proposed Budget

CATEGORY	Sponsor (UDOT)	BYU Contribution	Total
<b>1. Salaries and Wages</b>			
<b>A. Faculty Salary</b>			
PI: Mitsuru Saito	1	\$10,583	\$10,583
<b>B. Professional Staff (secretarial and technicians)</b>	\$0		\$0
<b>C. Student Wages</b>			
2 - Student Research Assistants	\$16,740		\$16,740
(Total: 1000 hrs at \$13/hr for Grad RA, 340 hrs at \$11/hr for Undergrad RA)			
<b>D. Fringe Benefits</b>			
32.4% on faculty academic salary	\$0		\$0
18.6% on faculty summer salary	\$1,968		\$1,968
7.8% for student summer (520 hrs)	\$527		\$527
32.5% on staff salary	\$0		\$0
<b>Total Salaries and Wages (1A+1B+1C+1D)</b>	<b>\$29,819</b>	<b>\$0</b>	<b>\$29,819</b>
<b>2. Travel &amp; Software Purchase</b>			
Meetings, data collection, presentation, communication	\$2,000		\$2,000
<b>Total Travel</b>	<b>\$2,000</b>	<b>\$0</b>	<b>\$2,000</b>
<b>3. Supplies</b>			
Publications (final report)	\$300		\$300
Office Supplies	\$250		\$250
			\$0
<b>Total Supplies</b>	<b>\$550</b>	<b>\$0</b>	<b>\$550</b>
<b>4. Direct Costs (1+2+3)</b>	<b>\$32,369</b>		<b>\$32,369</b>
<b>5. Indirect cost</b>			
10% of total direct cost	\$3,237		\$3,237
40% of total direct cost	\$	\$12,947	\$12,947
<b>Total indirect cost</b>	<b>\$3,237</b>	<b>\$12,947</b>	<b>\$16,184</b>
<b>7. Total Cost (5+6))</b>	<b>\$35,606</b>	<b>\$12,947</b>	<b>\$48,553</b>

# ATTACHMENT C

## SPECIAL TERMS AND CONDITIONS

**1. CONTRACT SCHEDULE, DELAYS AND EXTENSIONS:** The CONTRACTOR shall begin the work required by this contract within seven calendar days following written notification by the STATE to proceed and shall prosecute the work diligently to the satisfaction of the STATE and in accordance with the contract schedule (Attachment B to this contract). Completion of the contract in accordance with the schedule of Attachment B is the responsibility of the CONTRACTOR. Claims for changes in the contract schedule or extra work that may affect the contract schedule shall be submitted in accordance with the applicable provisions of this contract. Upon application in writing by the CONTRACTOR, the STATE may allow an extension of time beyond the agreed upon schedule, but by doing so does not waive any of its rights under the contract to secure full and complete contract performance.

**2. CHANGES AND EXTRA WORK:** The CONTRACTOR agrees to make no charges or claims for extra compensation due to delays or hindrances within its control. The CONTRACTOR shall notify the STATE in writing within seven calendar days of alleged changes to the contract due to differing site conditions, extra work, altered work beyond the scope of the contract, or actions taken by the STATE that changed the contract Terms and Conditions. Work associated with the alleged change shall be suspended immediately and before any expenses are incurred. The written notification to the STATE shall include the following:

- (a) The date of occurrence and the nature and circumstances of the occurrence that constitute a change;
- (b) Name, title and activity of each STATE representative knowledgeable of the change;
- (c) Identification of any documents and the substance of any verbal communication involved in the change;
- (d) Basis for the claim that the work is not required by the contract; and,
- (e) Detailed estimate of additional time and/or costs that would be incurred due to the change.

Failure of the CONTRACTOR to provide the required notice under this subsection shall constitute a waiver of any and all claims that may arise as a result of the alleged change. Following submission of the notification and in the absence of directions received to the contrary from the STATE, the CONTRACTOR shall continue diligent prosecution of the work under the contract to the maximum extent possible without impacting conditions of the alleged change. Within 14 calendar days after receipt of notice, the STATE shall respond in writing, either confirming or denying that a change has occurred, and advising the CONTRACTOR of the method and manner of further performance. Confirmed changes shall be followed by a negotiated written modification to the contract in accordance with the Contract Modifications clause of this attachment to the contract.

**3. DISPUTES:** Claims by the CONTRACTOR for services, materials, or damages not clearly authorized by the contract or not ordered by the STATE by prior written authorization in accordance with provisions herein dealing with changes and extra work are not binding upon the STATE. The parties executing this contract agree to use arbitration or mediation, after exhausting applicable administrative reviews.

**4. THIRD PARTY BENEFICIARY:** It is specifically agreed between the parties executing this contract that it is not intended by these contract provisions to create in the public or any member thereof a third party beneficiary hereunder, or to authorize anyone not a party to this contract to maintain a suit for personal injuries or property damage pursuant to the contract.

**5. PERSONNEL REQUIREMENTS & KEY PERSONNEL:** All officers, agents, volunteers, or employees of the CONTRACTOR shall have the proper training, skill, experience and licenses to meet acceptable standards of performance and as required by law. The key personnel identified in the Staffing Plan (Attachment B to this contract) shall be in responsible charge of the work during the entire term of this contract. Any change in personnel from that specifically identified in the Staffing Plan shall be subject to prior written approval by the STATE.

If at any time during the duration of this contract officers, agents, volunteers, or employees of the CONTRACTOR that are performing work under this contract fail to demonstrate the required expertise represented in the staffing plan (Attachment B to this contract), fail to perform the work in a professional and skillful manner or fail to retain licenses required by law, then the CONTRACTOR shall remove such person or persons from the work. If, upon the written request of the STATE, the CONTRACTOR fails to remove such person or persons or fails to furnish skilled and experienced personnel for the proper performance of the work, the STATE may terminate this contract with cause in accordance with the termination provisions of this contract.

**6. ASSIGNMENT AND SUBCONTRACTING:** The CONTRACTOR shall not subcontract any of the work required by this contract

**7. EMPLOYMENT OF STATE EMPLOYEES:** The CONSULTANT agrees not to engage in any way the services on this contract of any present or former STATE employee who was involved as a decision maker in the selection or approval processes or who negotiated and/or approved billings or contract modifications for this contract.

**8. RIGHT OF FUTURE DEVELOPMENT:** Both parties agree that the STATE and third parties that may be under separate contract to the STATE may perform future additional developments or enhancements to information, designs, analyses, computer elements, devices, data, test results, reports, graphics, presentations, visual aids, intellectual innovations that are derived from the work products developed and delivered under this contract. The STATE shall not be obligated to obtain the services of the CONTRACTOR to perform these additional developments or enhancements. Likewise, the CONTRACTOR, after completion of this contract, may perform future additional developments or enhancements to the work products produced and delivered under this contract without the necessity of granting the STATE a license of use for these additional developments or enhancements.

**9. USE OF PATENTED, COPYRIGHTED OR TRADEMARKED ITEMS:** The CONTRACTOR shall not use, employ or incorporate into the work of this contract any materials, products, devices, processes, computer elements, designs, specifications, publications, graphics or visual media, that are protected by patents, copyrights or trademarks that have been secured by the CONTRACTOR before entering into this agreement or that are owned by third parties to this contract unless specifically authorized in this contract or by prior written approval from the STATE to do so. When such authorization is provided, the CONTRACTOR shall secure the rights of use of these patented, copyrighted or trademarked items for the STATE. An original executed copy of the right-to-use agreement shall be delivered to and approved by the STATE prior to commencing use of these item(s). The CONTRACTOR shall be responsible for payment of all royalties and fees for said use during the entire term of this contract. The CONTRACTOR and their surety shall indemnify and save harmless the STATE from any and all claims of patent, copyright or trademark infringement, or for costs, expenses, penalties and damages that may be obligated by reason of an infringement related to the work performed, services rendered or deliverables furnished under this contract. When Federal funds make up all or part of the remuneration under this contract, the United States Department of Transportation shall be named along with the STATE in all legal agreements covering use of patented, copyrighted or trademarked items.

**10. CONFIDENTIALITY:** If, in order to perform the work under this contract, the CONTRACTOR is given access to confidential or proprietary business, technical or financial information regarding persons, materials, products, devices, processes, designs, computer elements, analyses, or data, the CONTRACTOR agrees to treat such information as confidential and shall not appropriate such information to its own use or disclose it to third parties at any time, neither during the term of this contract nor after contract termination, without specific written authorization by the STATE to do so. The CONTRACTOR shall require adherence by its officers, agents, volunteers, and employees to these confidentiality provisions.

The foregoing obligations shall not apply if the said confidential or proprietary information:

- (a) Is found to be in the public domain at the time of receipt by the CONTRACTOR;
- (b) Is published or otherwise becomes part of the public domain after receipt by and through no fault of the CONTRACTOR;
- (c) Was in possession of the CONTRACTOR at the time of receipt, which the CONTRACTOR can demonstrate, as well as that it was not acquired directly or indirectly from the STATE or an agency of the State of Utah; or
- (d) Was received by the CONTRACTOR from a third party other than an agency of the State of Utah, which the CONTRACTOR can demonstrate did not require the CONTRACTOR to hold such information in confidence.

Also, the work products to be developed, gathered or delivered under this contract, including materials, products, devices, processes, computer elements, designs, analyses, data, specifications, findings, recommendations, and conclusions, shall be considered confidential by the CONTRACTOR during the term of this contract in accordance with the above provisions. If the contract is terminated with or without cause prior to completion or delivery of the work products, or their acceptance by the STATE, the CONTRACTOR agrees to maintain the confidentiality of the work products for a period of not less than one calendar year following the date of termination.

The STATE at its sole discretion may choose to release into the public domain all or part of the work products developed under this contract prior to completion of the work or expiration of the contract. In this case the CONTRACTOR is relieved of the above described confidentiality requirements for that portion of the work that is released by the STATE.

It is further specifically agreed between the parties executing this contract that the above provisions regarding confidentiality shall be interpreted and administered in accordance with State and Federal non-disclosure and disclosure laws, rules, regulations and policies governing patents, copyrights, trademarks, rights of privacy and freedom of public information.

**11. INSPECTION AND REVIEW:** It is agreed that authorized representatives of the STATE and other third parties designated by the STATE shall have the right to inspect and review the work in progress at any time during normal business hours or by appointment.

All deliverables furnished under this contract shall be subject to the inspection and review of the STATE and other third parties designated by the STATE to perform technical or fiscal inspections or reviews. The CONTRACTOR shall be required to perform such additional work as may be necessary to meet the objectives of the work plan (Attachment B to this contract) and to make clarifications or correct errors uncovered during reviews or inspections without undue delays and without additional cost to the STATE.

**12. PROGRESS AND PROGRESS REPORTS:** In addition to the other deliverables (Attachment B to this contract), the CONTRACTOR shall prepare fiscal and technical progress reports following the format established by the STATE and in sufficient detail to document the progress of the work and to support the claim for payment. As a minimum the progress reports shall identify the deliverables completed, for which payment requests are being made, a brief synopsis of the deliverable contents, and the invoice number of the payment request. Anticipated problems in completing future deliverables in accordance with the technical and schedule requirements of the contract shall be identified if applicable and the background behind them. Payments will not be made without a supporting progress report.

**13. MEETINGS/CONFERENCES:** Progress and review meetings/conferences will be held as required and not less than at quarterly intervals. Either party may request a meeting/conference

**14. REPORTS, DOCUMENTATION AND OTHER MEDIA PRODUCTS:** Progress, interim and final reports, white papers, technical notes and other documentation and media products produced as deliverables under this contract shall conform to the highest standards for literary style, grammar, spelling, graphic art and technical accuracy. They shall be subject to review by the STATE, its representatives and agents, as well as other funding agencies and partners, prior to publication and distribution. If the documentation contains contributions by the STATE or third parties, these entities shall be fully acknowledged in the documentation. Except where acknowledged otherwise, the CONTRACTOR shall be solely responsible and liable for the accuracy, completeness and originality of the contents, findings and conclusions. The responsible person(s) or principal investigator(s) for the CONTRACTOR listed in Staffing Plan (Attachment B to this contract) shall be the primary author(s) of the documentation.

The above-described documentation shall not contain advertisements or attempts to promote materials, equipment, products or services supplied by or the special interests of the CONTRACTOR or third parties to this contract. The documentation shall be free of libel or slander relating to individuals, organizations and groups or their materials, equipment, products or services.

Interim reports, when required, shall be concise and focused on the specified aspects of the work. They may be submitted in draft form. They are expected to form a component of the draft final report. They are intended for review by the STATE and other sponsoring entities and not for publication. Review comments received from the STATE, either written or in conference, shall be addressed by the CONTRACTOR in the final report. The interim reports need not be reissued with corrections addressing these comments.

The CONTRACTOR shall submit a final report that summarizes the detailed research findings of study, including the data collection plan, the methodology used in and the results obtained from the detailed data reduction, the results of analysis and the comparisons with existing theories and findings of other researchers in the field. The final report shall also summarize the contents of any interim reports furnished as well as provide a background for the subject matter and the justification for funding the research. It shall include comparisons with current design practice and recommendations for implementation of the findings, as well as conclusions and acknowledgments. Abstracts of no more than 250 words and executive summaries of no more than 10 pages shall be developed that provide synopses of the final report. The final report shall be a complete, stand-alone document intended for publication by the STATE. Review comments received from the STATE, either written or in conference, shall be addressed by the CONTRACTOR in the final version of the final report.

Reports intended for publication by the STATE shall include the following minimum elements:

- Standard UDOT/FHWA title and abstract pages;
- Table of contents;

- List of Figures and Table
- Executive Summary;
- Body of report;
- Implementation Plan and/or recommendations;
- Acknowledgments;
- List of References; and
- Appendices.

The body of reports intended for publication shall summarize the subject matter in sufficient detail to support the recommendations and conclusions. Charts, graphs, figures, tables, illustrations and photographs shall be used extensively to enhance communication. Graphs and tables are to be neat in appearance with axis clearly marked with proper units. A legend is to be provided on every graph that clearly describes acronyms and other symbols. Graphical element patterns and symbols should be carefully chosen to ensure legibility after reproduction. Raw data, detailed analysis and theoretical developments shall be contained in appendices.

The Implementation Plan should contain sufficient information to: a) provide direction on steps needed to implement the technology or products developed under this contract; b) provide recommendation on staffing needs and resources, list individuals and organizational roles and responsibilities for implementation; and c) provide estimated cost of implementation. Technologies or products could include any of the following, but not limited to: written specifications; policies and procedures; newsletters; research technical reports; training sessions; laboratory testing results; workshops, and technology demonstrations. If the technology or products are not developed to a state of implementation, specific recommendations should be provided on what is needed to bring it to such a state.

References to other documents containing the raw data, detailed analysis or theoretical developments may be cited to avoid repetition, providing these documents are published prior to the subject reports. If references are used, a sufficient summarization shall be included in the reports to communicate both the findings and conclusions of the authors cited and their significance to the recommendations and conclusions of the subject reports. Also, full bibliographic acknowledgments shall be made for all references cited.

Reports intended for publication by the STATE shall conform to the format criteria established by the STATE. After all review comments are considered and corrections are made by the CONTRACTOR, one (1) original final draft version of the report suitable for photocopying shall be delivered to the STATE, along with a full and complete electronic copy. If the final draft version is over 50 pages, the report shall be formatted for double-sided reproduction and/or printing.

Unless otherwise approved in writing by the STATE, electronic versions of documents or work products required to be delivered under this contract shall be produced in the file formats native to the computer applications adopted as standard by the STATE. The electronic delivery media, as well as photographic, audio and video deliverables shall conform to the format established by the STATE.

The reports required under this contract are intended to be summary in nature. In addition to the report to be published by the STATE as outlined above, it is anticipated that detailed aspects of the work performed under this contract may be published by others (thesis, journal or articles). However, work in progress shall be subject to the confidentiality provisions of this contract.

**15. REQUIREMENTS FOR COMPUTER ELEMENTS:** Hardware, firmware and/or software elements that the CONTRACTOR procures, furnishes, licenses, sells, integrates, creates and/or enhances for the STATE under this contract shall achieve the specific objectives specified in the work plan (Attachment B to this contract).

**16. CONTRACT AMOUNT AND PAYMENT PROVISIONS:** The amount due for the work performed under this contract may be based on the fixed amount as described in Attachment B to this contract.

The total contract amount due shall be paid in lump sum partial payments according to the schedule and the list of deliverables and payments contained in Attachment B to this contract, but not more than the fixed price amount of this contract and written modifications thereto.

As a minimum, the invoice shall list the name of the CONTRACTOR, the STATE Contract Number, the invoice date and the remittance address. Also, the invoices shall list the deliverable item number from the List of Deliverables shown in Attachment B, its description, the payment basis and the actual partial payment amount due. Invoices for cost reimbursement deliverables shall itemize each cost entry, showing the units, the unit costs and the total amount of each item. In addition, invoices shall be accompanied by a progress report and specified deliverables listed in Attachment B.

Invoices for payment shall be submitted upon delivery of each item listed in the List of Deliverables shown in Attachment B, but not more often than monthly. Invoices and progress reports shall be submitted to:

Utah State Department of Transportation  
Attn.: Doug Anderson  
Research Development  
Box 148410  
Salt Lake City, UT 84114-8410

The STATE shall process invoices for payment within thirty (30) days after receipt. However, the STATE, at its sole discretion and after giving the CONTRACTOR written notification, may delay payment of invoices that are disputed or that are submitted without the specified forms, reports and deliverables as outlined.

**17. CONTRACTOR SUBSTANCE ABUSE:**

The CONTRACTOR shall ensure that its agents and employees are not under the influence of, and do not use, possess, consume, transfer, manufacture, or sell or attempt to sell any form of alcohol, intoxicant, narcotic, depressant, stimulant, hallucinogen or any illegal drug or mind or perception-altering substance (except the taking of a prescribed drug under the direction of a licensed, qualified physician where the medication does not affect judgment, perception or performance) while on the STATE's property or while performing work or engaging in the activities called for under this contract. In each case where drugs that could have any effect upon an individual's ability to perform work are being taken under the direction of a licensed physician, the agents and employees of CONTRACTOR and all of its subcontractors taking the drugs shall be required to notify CONTRACTOR who shall maintain a list of those agents and employees. Failure to meet any of the above requirements or correct noted deficiencies are grounds for contract termination.

The above requirements shall not be exercised so as to infringe upon the rights of government employees secured under the Fourth and Fourteenth Amendments to the Constitution of the United States.

**18. INSURANCE:** For all work provided under this contract, the CONTRACTOR shall maintain their own insurance of the types and with the limits as set forth hereinafter at their own expense, with coverage that recognizes the STATE's Project Sites. CONTRACTOR shall promptly furnish the STATE, or its designated representative, certificates of insurance giving evidence that all required insurance are in force. Specific requirements for certificates of insurance shall be as delineated hereafter. All insurance shall be kept in force through the entire duration of the Work.

**(a) Insurance Types and Limits:**

**(1) Workers Compensation:**

CONTRACTOR/ subcontractors shall provide, at their own expense, Workers' Compensation Insurance to cover full liability under the Workers' Compensation Laws of the jurisdiction in which the Project is located at the statutory limits required by said jurisdiction's laws.

**(2) Automobile Liability:**

CONTRACTOR shall provide, at their own expense, Automobile Liability Insurance for claims arising from the ownership, maintenance, or use of a motor vehicle at, upon, or away from the Project Site. The insurance shall cover all owned, non-owned, and hired automobiles used in connection with the Work, with the following minimum limits of liability:

\$1,000,000      Combined Single Limit Bodily Injury and Property Damage Per Occurrence

**(3) Valuable Papers and Records:**

Valuable Papers and Records and/or Electronic Data Processing (Data and Media) Coverage. The CONTRACTOR/subcontractor shall provide coverage for the physical loss of or destruction to their work product including drawings, specifications and electronic data and media, if available.

**(b) Certificates of Insurance:**

Upon execution of the contract and before issuance of a Notice to Proceed the CONTRACTOR shall provide to the STATE a Certificate of Insurance setting out coverages, limits and amendments to the certificate necessitated by changes to the work to be performed under the contract until the date of final payment. Said certificate shall state that the policies required have been endorsed to provide that the insurers issuing said policies shall give the STATE not less than thirty (30) days prior written notice in the event of cancellation. Any coverage written on a claims-made basis shall be indicated as such on the certificate of



insurance. And, except for CONTRACTORS that are STATE, agencies, educational institutions, foundations or other entities of the State of Utah, said certificates shall state that all policies required have been endorsed to name the State of Utah and the STATE as Additional Insured. Certificates shall be in a form and content satisfactory to the STATE. CONTRACTORS or subcontractors of all tiers that are STATE's, agencies, educational institutions, foundations or other entities of the State of Utah shall obtain certificates for the required insurance from the State of Utah Risk Manager.

All insurance described in this contract shall be written by an insurance company or companies authorized to do business in Utah and satisfactory to the STATE. No party subject to the provisions of this contract shall violate or knowingly permit to be violated any of the provisions of the policies of insurance described herein. Insurance companies with a Best's rating "A- VIII" or better or with the Utah State Risk Management Fund should provide all insurance.

All insurance policies, except Professional Liability Insurance, shall be primary and non-contributing with, and not in excess of, any other insurance available to the STATE.

**(c) Other Insurance:**

Any type of insurance or any increase of limits of liability not described herein that the CONTRACTOR requires for its own protection or on account of any statute shall be its own responsibility and at its own expense. CONTRACTOR shall have the responsibility to make sure their insurance programs fit their particular needs, and it is their responsibility to arrange for and secure any insurance coverage, which they deem advisable, whether or not specified above.

**(d) No Release:**

The carrying of the above-described insurance shall in no way be interpreted as relieving the CONTRACTOR of any other responsibility or liability under this agreement or any applicable law, statute, regulation or order.

**19. DUTIES OF THE STATE:** The STATE shall provide access to and make provisions for the CONTRACTOR to enter upon all work areas, both public and private, deemed necessary for completion of the work under this contract.

The STATE shall give prompt consideration to all reports, plans, proposals and other documents presented by the CONTRACTOR.

**20. OWNERSHIP OF WORK PRODUCTS PROCURED OR DEVELOPED UNDER THIS CONTRACT:** The STATE retains ownership of all materials, products, devices, equipment, facilities, data, test results, reports, graphics, presentations, visual aids, computer elements, software license agreements, testing apparatus, or services that are developed, procured, constructed, installed or performed under this contract and that become an integral part of or that are intended to facilitate or enhance the use, operation, maintenance, documentation or understanding of the deliverables of this contract. On the other hand, the CONTRACTOR may secure through patents, copyrights or trademarks, the ownership of information, designs, analyses, processes, devices, and the intellectual innovations that may be created or developed under this contract. However, the CONTRACTOR agrees to abide by the confidentiality provisions of this contract. The CONTRACTOR shall notify the STATE in writing within 30 calendar days of any applications for patents, copyrights or trademarks related to work under this contract. In addition, through provisions provided by law, the CONTRACTOR grants to the STATE a royalty-free, nonexclusive, and irrevocable license to use the work products delivered under this contract, for which patents, copyrights or trademarks are secured by the CONTRACTOR. These license provisions shall be considered one of the deliverables due under this contract. When federal transportation funds make up all or part of the remuneration under this contract (as documented elsewhere in these supplemental provisions), the United States Department of Transportation shall also be named as a grantee, along with the STATE, in the license provisions described above. The right of the CONTRACTOR to apply for patents, copyrights or trademarks shall be limited to the statutory period defined by United States Code.

**21. NOTICES:** Legal notices applicable under this contract shall be in writing and shall be delivered by certified mail to the following designated individuals for the CONTRACTOR and the STATE, with a copy sent to the technical representative designated below:

- **CONTRACTOR'S Contract Representative:**  
Gary Reynolds, Director  
Brigham Young University  
Office of Research and Creative Activities  
A-285 ASB  
Provo, UT 84602  
Business Phone: (801) 422-6177  
Business Fax: (801) 422-2138

Email: gary\_rey\_js@byu.edu

- STATE'S Contract Representative  
Denice McCarthy, Purchasing Agent  
Utah State Department of Transportation  
Box 148260  
Salt Lake City, UT 84114-8260  
Business Phone: (801) 965-4761  
Business Fax: (801) 965-4073  
Email: dmccarthy@utah.gov

Technical representatives for the CONTRACTOR and the STATE that are to receive or respond to technical questions or comments, deliverables, reviews, and other non-legal correspondence except invoices shall be the following individuals:

- CONTRACTOR'S Technical Representative:  
Grant Schultz, Ph.D., P.E., PTOE  
Brigham Young University  
Dept. of Civil & Environmental Engineers  
368 Clyde Building  
Provo, UT 84602  
Business Phone: (801) 422-6332  
Business Fax: (801) 422-0159  
Email: gschultz@byu.edu
- STATE'S Technical Representative:  
Doug Anderson  
Utah Department. of Transportation  
Research & Development  
Box 148410  
Salt Lake City, UT 84114-8410  
Bus. Phone: (801) 965-4377  
Bus. Fax: (801) 965-4796  
Email: danderson@utah.gov

## STATE OF UTAH

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Division of Purchasing Tracking

SOLE S

#SS05218

Sole Source Procurement is appropriate only if a pu  
single supplier or if it otherwise qualifies under the

ALL SOLE SOURCE REQUESTS OVER \$1,000 MUST BE PRE-APPROVED BY STATE PURCHASING.

NOTE: THIS WORD DOCUMENT IS DESIGNED TO ALLOW THE REQUESTOR TO COMPLETE EACH SECTION WITH  
AS MUCH INFORMATION AS APPROPRIATE TO FULLY RESPOND.

It is anticipated the procurement will result in a (check one):

- ☒ **Agency Contract** email this form to [johndavis@utah.gov](mailto:johndavis@utah.gov) prior to contract negotiations. No RX is  
required. Requested term of contract (include any renewal options): one year no renewals
- ☐ **Purchase Order** Enter RX into Finet, insert the RX Number \_\_\_\_\_, email this form to the  
appropriate State Purchasing Agent and send a copy of the quotation from the vendor.

Department Requesting Authorization: Department of Transportation

Division: Procurement /Research Division

Contact Person and Title: Denice McCarthy, UDOT PURCHASING AGENT

email address: [dmccarthy@utah.gov](mailto:dmccarthy@utah.gov)

Phone number: 801-965-4761

Product/service to be purchased:

Cost: \$ 12,947.00

Recommended Supplier: Brigham Young University

Contact Person: Gary Reynolds

email address: [gary\\_reynolds@byu.edu](mailto:gary_reynolds@byu.edu)

Phone number: (801) 422-6177

Address including zip code:

Brigham Young University

Office of Research & Creative Activities A-261 ASB

Provo, Utah 84602

Finet vendor number: 19106D

Complete the following if no Finet number exists. Federal Tax ID# (TIN) or Social Security #:87-0217280  
(must be 9 digit number) (If submitting a Social Security #, the persons' name must appear as it does on Social Security card.)

Type of Supplier(check one): ☐ corporation ☐ medical provider (all types) ☐ proprietorship/individual  
☒ partnership ☐ government ☐ other

Sole source request is based on which of the following (check all that apply):

- ☐ Compatibility of equipment/service (please complete sections A and B)
- ☐ Trial or Testing (please complete section C)
- ☐ Equipment/service is only available from a single supplier in the U.S. (please complete section A)
- ☒ Compatibility of professional services (please complete section A)

## **Justification:**

### **Brief description**

This project combines the three related problem statements presented at the 2005 UTRAC: "Use of Work Zone Crash Histories – Data Mining Project," "Determination of Crash Costs for Use in Benefit/Cost Analysis," and "Time Factor in Analysis of Work Zone Related Crashes." All these three studies can be done by one data set of crash records and work zone records. Hence, by collecting crash data and work zone histories (including traffic control measures used) once, the goals of these three studies can be achieved.

Due to the need for upgrades, Utah highways are constantly under maintenance, rehabilitation, and reconstruction work. Safety in work zones is a high priority for UDOT. However, the relationship between work zone crashes and traffic control measures, the relation between highway improvements and accident reduction rate, and the crash occurrence as a function of the work scheduling are not yet clear. Now that the Crash Data Delivery System of UDOT contains crash data ranging from 1994 to 2003, it is possible to conduct an in-depth work zone crash data analysis to shed light to these issues.

The results of this study can be used to develop a set of guidelines for selecting proper cost effective work zone traffic control measures, to conduct benefit/cost analyses of highway improvements in terms of crash reduction, and to allocate effectively work zone traffic enforcement budgets.

**Dr. Mitsuru Saito with Brigham Young University is the only consultant in Utah that has significant experience in analyzing the safety aspects of construction and work zones. His work on the studies mentioned above is the basis for this unique knowledge.**

Sole sourcing with Dr. Saito will reduce the need for an extensive period of reviewing the literature on this issue. Only a small effort will be needed to review very recent publications. It will also reduce the chance for errors related to the analysis of the data acquired during the study

### **Section A. GENERAL INFORMATION**

1. What is unique about this product/service to justify a sole source?  
*A key aspect of this study is to determine how innovative work zone strategies will perform in the State of Utah. Dr. Saito is the only expert to conduct studies on this topic in the state.*
2. Could the product/service be reasonably modified to allow for competition?  
*No. Because of the very specific nature of the data and information required, only the exact will suffice*
3. Explain the market research performed to make the sole source recommendation?  
*This is very small segment of the traffic engineering industry, a few phone calls provide the same result. Based on a reputation built on past studies and body of work he has published in this and other related areas, Dr. Saito has been the only practical choice.*
4. List the names of suppliers contacted, contact person and a summary of their response?  
*An investigation that was done by UDOT this year of University Faculty, identified Dr. Saito as the only qualified Principle investigator with this specific expertise in Utah.*
5. Complete disclosure must be included with this request if the requestor has any personal, financial or fiduciary relationship with the recommended supplier. *I confirmed UDOT /BYU has no personal, financial or fiduciary relationship in this project.*

Requested by:

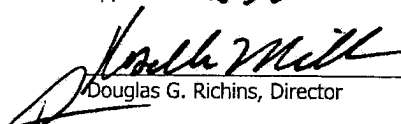
Denice McCarthy  
Agency Signature

04/28/05  
Date

Title: UDOT/ Purchasing Agent

Approved:

R33.3.216

  
Douglas G. Richins, Director

5/3/05  
Date

Utah Division of Purchasing & General Services

**NOTE: When submitted by email, type requestors' name on the signature line. The email will constitute the electronic signature.**